Improving Sleep Through Management of Stress and Anxiety

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Objectives

- Review biological mechanisms of stress affects on sleep.
- Review mechanisms of insomnia.
- Review the role for Relaxation Training in treatment of insomnia.
- Review different methods of Relaxation Training.
- Become familiar with some practical approaches to introduce Relaxation Training in the clinical setting.
Stress and Insomnia

- Stress exposure is a significant predictor of insomnia onset.
- Stress response in the form of cognitive intrusion and specific maladaptive coping behaviors mediate the effects of stress exposure.
  - Pillai V, Roth T, Mullins HM, Drake CL. Moderators and mediators of the relationship between stress and insomnia: stressor chronicity, cognitive intrusion, and coping. *SLEEP* 2014;37(7):1199-1208
Stress in Today’s World

- Mood problems are increasing so fast that by 2020 they will outrank AIDS, accidents and violence as the primary causes of early death and disability.
- Signs that stress may be affecting your mood may included worry, feeling overwhelmed, concentration problems, cravings for chocolate or wine, and... insomnia!
Sleep and Stress are like Oil and Water

- Stress may lead to anxiety, agitation, fear, and other psychological effects.
- Anxiety, agitation, etc... are not very compatible with sleep.
- Example:
  - Everyone has had a dream they are falling. I’ve never met anyone who has finished the dream and traumatically injure themselves.
  - And when people do dream of prior trauma, that has a name—PTSD—which is highly associated with sleep disturbances.
Insomnia as a Symptom

- Insomnia may best be viewed as a "symptom" rather than a disease process. Often, it accompanies another cause or disorder.
  - Kryger, *Principles and practice of sleep medicine*.
- Parallel Example: Fever is a symptom. Fever may occur from influenza or a wound infection. Tylenol may make you comfortable during a fever, but to give it daily does not treat the infection source.
- Hypnotic sleep aids may help with insomnia—initially—but do not treat the source.
Pharmacologic vs. Behavioral

- Morin and colleagues addressed the relative short and long term efficacy of pharmacological and nonpharmacological interventions for insomnia.
  - Weekly sessions of CBT provided in groups of four to six patients.
  - Temazepam 7.5 to 30 mg one hour before bedtime, as needed but at least two to three times per night. Patients met weekly with study physician for 20 minutes.
  - Combination of the two (Combined)
- Pill placebo administered with the same instructions and physician visits as temazepam in a double blind fashion.
- The study demonstrated that the three active treatments were similarly effective immediately after the last treatment dose, and that participants receiving CBT either alone or in combination with temazepam maintained their gains better and had better sleep two years after.
Hyperarousal Theory

- Neurological research suggests that brain “hyperarousal” is associated with insomnia.
- The way I explain this to patients is by comparing “brain rhythms” with heart rates. That is, just as we have a heart rate, we also have brain rhythms that influence brain arousal. As we rest, our heart rate generally slows, as does our brain rhythms as we get drowsy. Emotions such as fear, anger, and anxiety cause your heart rate to speed up. And likewise, those same emotions (anxiety, hyperactivity, fear) increase the level of our brain arousal.
Cortisol Activation in Stress

- With stress different hormones are secreted, including the stress hormone cortisol.
- Cortisol is released by the adrenal glands during the stress response.
- Cortisol then stimulates the amygdala (our fear area) and inhibits the hippocampus (our memory making area).
- Repeated sympathetic nervous system/HPAA activity makes the amygdala (fear area) more reactive to apparent threats, which in turn increases SNS/HPAA activation.
- It’s a feedback loop as such activation further sensitizes the amygdala.
Increased Physiological Arousal

- Stimuli that increase metabolic rate, sympathetic-system activation or action of the hypothalamic-pituitary-adrenal axis, increase the physiological arousal state. These can be primary or secondary to anxiety, physical discomfort, or primary sleep disorders. Such disorders may promote transient awakenings and increases in sympathetic tone.

Insomnia and Increased Alertness

- Most individuals complaining of insomnia, this state of elevated cortical arousal leads to increased alertness.
- Commonly the person has become “conditioned” to having night after night of sleeplessness.
- As a consequence, many patients, despite decreased sleep efficiency, will not show tendencies to daytime sleepiness, when assessed with the Multiple Sleep Latency Test.
Arousals and Heart Rates

• Study demonstrates link between heart rate and cortical arousals.
• Arousals were scored using the AASM criteria. The EEG signals’ time and frequency characteristics were determined using wavelet analysis.
• There was a strong correlation between arousal scale and change in heart rate within each subject.
• Arousal intensity, quantified by wavelet transform, is strongly associated with arousal-related tachycardia.
  • Azarbarzin A; Ostrowski M; Hanly P; Younes M. Relationship between arousal intensity and heart rate response to arousal. *SLEEP* 2014;37(4):645-653
Increased Metabolic Rate

- Example of “hyperarousal” comes from a study by Bonnet and colleagues.
- Whole body metabolic rate was measured by oxygen consumption (VO₂ max) during sleep and wakefulness.
- The study showed that the insomnia patients had a higher metabolic rate at every point during the 24-hour measurement, including during sleep.
- This elevated metabolic rate suggests “hyperarousal” during both sleep and wakefulness in patients with insomnia.
Cortisol and Insomnia

- Patients with insomnia have been found to have elevated urinary catecholamines, catecholemine metabolites, and stress hormone levels, such as cortisol.
- Vgontzas et al measured plasma adrenocorticotropic hormone and cortisol during the sleep period in insomnia patients and healthy control subjects.
- During the first half of the night, when values for these hormones are typically low, insomnia patients showed significantly elevated values compared to healthy control subjects.
- Although the 24-hour values were not elevated in the patient group, the study nonetheless suggests “hyperarousal” in the hypothalamic-pituitary-adrenal axis during the first part of the sleep period.
Hyperarousal on EEG in Insomnia

- Hyperarousal demonstrated through decreased delta power and increased beta power among individuals with insomnia.
- Delta EEG activity, or “slow wave activity,” represents low frequency EEG activity, typically seen during deep Non-REM sleep stages, such as N3 SWS.
- Beta EEG power refers to fast EEG frequency activity; beta activity is typically seen during wakefulness and attention.
- Merica and colleagues measured the EEG power spectra of insomniacs and healthy controls.
- The insomnia group had reduced delta power (typical of deep non-REM sleep) across the night, particularly in the first part of the night where delta power is typically highest.
- On the other hand, the insomnia group had increased beta power across the entire night compared to healthy controls.
PET Studies in Insomnia

- Hyperarousal in insomnia has been noted from positron emission tomography (PET).
- Nofzinger and colleagues examined the correlation between regional glucose metabolism, measured by PET studies during non-REM sleep, and beta EEG power, measured by sleep EEG.
- In healthy subjects, increased beta EEG power was correlated with activity in the orbitofrontal cortex and the anterior cingulate cortex, two areas known to be involved in behavioral arousal and attention. The same correlation was observed between glucose metabolism in the orbitofrontal cortex and beta EEG power in depressed subjects. However, the depressed group had higher beta EEG power.
- This study shows that the insomnia of depression is also related to central nervous system “hyperarousal” (marked by increased beta EEG power), and that this type of arousal is directly related to activation of brain regions known to be involved in the regulation of behavioral arousal.
Psychophysiological Insomnia

- Psychophysiological insomnia may best be viewed as conditioned or learned insomnia.
- A person may have difficulty initiating or maintaining sleep for whatever reason and then become frustrated, fearful and anxious related to the entire sleep process.
- Despite the person’s efforts to “try to fall asleep”, the degree of anxiety will cause further physiological activation.
- This heightened level of physiological activation causes them to develop behaviors to try to promote sleep, such as turning on the TV or radio, behaviors that actually exacerbate the insomnia.
- This sets up a repeating cycle.
  - Insomnia. Etiology, Evaluation, & Treatment. 2006 AASM
Practice Parameter

- AASM (American Academy of Sleep Medicine) Practice Parameter
- Insomnia - Stimulus control therapy, relaxation training, and cognitive behavior therapy are individually effective therapies in the treatment of chronic insomnia (Standard) and sleep restriction therapy, multicomponent therapy (without cognitive therapy), biofeedback and paradoxical intention are individually effective therapies in the treatment of chronic insomnia (Guideline)
  - *Sleep*. 2006 Nov 1;29(11):1415-9
Behavioral Treatments for Insomnia

- **Sleep Hygiene:**
  - Promote habits that help sleep; provide rationale for subsequent instructions.

- **Stimulus Control:**
  - Strengthen bed & bedroom as sleep stimulus

- **Sleep Restriction:**
  - Restrict time in bed to improve sleep depth & consolidation

- **Cognitive Therapy:**
  - Address thoughts and beliefs that interfere with sleep.

- **Circadian Rhythm Entrainment:**
  - Reset or reinforce biological rhythm

- **Relaxation Training:** *Reduce arousal & decrease anxiety*

*Insomnia. Etiology, Evaluation, & Treatment. 2006 AASM*
Relaxation Training

- Diaphragmatic breathing
- Meditation and guided imagery
- Biofeedback (EMG)
- Progressive muscle relaxation
- Relaxation should be introduced and practiced with the goal of reducing arousal levels.
  - *Insomnia. Etiology, Evaluation, & Treatment.* 2006 AASM
- Other...
Relaxation Therapy

- Some have defined relaxation therapy as quiescent self inquiry.
- An individual is not moving, attention is focused inwardly, and the individual is in control of one's thoughts and emotions.
- Through relaxation we attempt to experience physiological and cognitive calm sensation.
- There is an effect of control over biological and behavioral components.
  - Lichestein. *Behavioral Sleep Medicine Series: Relaxation Approaches to Insomnia Webinar*. 2009 AASM.
Relaxation

- Relaxation is not a sleep specific therapy.
- Relaxation is cheap, portable, and can used it at home or travel.
- But most of all remember that sleep and panic are incompatible.
- Another unintended use of relaxation is the development of self confidence.
- Shown to have physiological control of decreased heart rate, decreased blood pressure, and decreased skin conductance.
  - Lichestein. *Behavioral Sleep Medicine Series: Relaxation Approaches to Insomnia Webinar*. 2009 AASM.
- And it is more natural then the OTC (Over The Counter) melatonin that is synthetically produced.
The Relaxation Response

Four Ingredients to Relaxation Response

1. Quiet environment – Distractions are not helpful
2. Mental device – Monotmous occupying of the mind
3. Passive attitude – Allows transfer of transfer of relaxation to other parts of day. You cannot force relaxation to occur, the harder the you try the more difficult.
4. Comfortable position
   - Lichstein. *Behavioral Sleep Medicine Series: Relaxation Approaches to Insomnia Webinar*. 2009 AASM.
Calming the Heart Calms the Mind

- When you are anxious, your heart races and so does your mind.
- When you are calm, your heart calms and so does your mind.
- When you inhale, your heart rate is variable.
- When you exhale, your heart rate slows.
- When you take a mere 30 seconds to a minute and you spend more time exhaling, the heart calms and so does the mind. You may feel drowsy or dizzy, that is your mind calming. If you feel dizzy, slow it down and take some regular breaths in between.

History of Therapeutic Relaxation

- Therapeutic relaxation is said to have been developed by Hindu’s in India 5,000 years ago.
- Over the years it has had several other names and forms, Yoga, Meditation, Mindfulness, Biofeedback, etc...
- In 1975 a Harvard doctor, Benson, wrote a book called *The Relaxation Response*. Dr. Benson studied the different types of relaxation therapy that had been described through history. Components that were common to methods of relaxation included a quiet environment, mental device, passive attitude, and comfortable position.

Lichstein. *Behavioral Sleep Medicine Series: Relaxation Approaches to Insomnia Webinar*. 2009 AASM.
Quiet Environment

- Distractions are not helpful.
- When trying to control your thoughts, sounds may distract and pull your mind away.
- When trying to induce sleep, your brain rhythm goes to a slowing frequency, so does your heart rate.
- Sudden sounds or talking can not only startle, but if you are actively trying to listen that induces a wake rhythm.

- Lichstein. *Behavioral Sleep Medicine Series: Relaxation Approaches to Insomnia Webinar*. 2009 AASM.
Mental Device

- The mental device refers to a monotonous, repetitive focus of your mind.
- The focus may be on an object in the room or even a memory.
  - Lichestein. *Behavioral Sleep Medicine Series: Relaxation Approaches to Insomnia Webinar*. 2009 AASM.
Passive Attitude

- The passive attitude is the key in relaxation response. Environments may change.
- Mental device or your object of focus can also change with travel.
- With a passive attitude the transcendence to relaxation can not only occur, but allow it to transfer into other parts of our 24 hour day as well.

- Lichstein. *Behavioral Sleep Medicine Series: Relaxation Approaches to Insomnia Webinar*. 2009 AASM.
Diaphragmatic (abdominal) breathing facilitates slowing of respiration, thus leading to a state of relaxation.

It is relatively easy to learn and can induce relaxation relatively quickly.

- *Insomnia. Etiology, Evaluation, & Treatment.* 2006 AASM
Meditation

- Meditation practices direct attention away from intrusive distressing thoughts.
  - *Insomnia. Etiology, Evaluation, & Treatment. 2006 AASM*

- Mediation is common, as there seem to be an uncountable number of meditation techniques.
- Generally requires a comfortable position.
- One can meditate to a particular word or concept, which this is called a mantra.
- Other forms of focus can include an image, an object, or even a sensation such as wind. The object can be a mental image, but it could also be a real one that you see in the room you are in.
  - Lichstein. *Behavioral Sleep Medicine Series: Relaxation Approaches to Insomnia Webinar. 2009 AASM.*
Autogenic Meditation

- Autogenic meditation involves the focus of feeling heat and warmth sensations.
- This can be combined with sensations of nature scenes or other pleasant scenes.
- Physiologic process may lead to slowed breathing, decreases in heart rate and blood pressure.
  - Lichestein. *Behavioral Sleep Medicine Series: Relaxation Approaches to Insomnia Webinar*. 2009 AASM.
Guided Imagery

- Imagery training helps the patient imagine a neutral or pleasant image.
- Vivid imagery can directly induce a relaxed state or function indirectly by diverting attention from an anxiety-provoking stimulus.
  - *Insomnia. Etiology, Evaluation, & Treatment. 2006 AASM*

- Imagery is one of the most common forms of relaxation.
- The most common focus is of pleasant nature scenes, and usually of natural scenes that an individual has experienced. One can even recall the sounds and scents.
  - Lichestein. *Behavioral Sleep Medicine Series: Relaxation Approaches to Insomnia Webinar. 2009 AASM.*
Biofeedback

- Biofeedback can assist relaxation by providing visual or auditory feedback to inform the patient whether the target physiological correlate of relaxation has been attained.
  - *Insomnia. Etiology, Evaluation, & Treatment.* 2006 AASM
- Biofeedback has been shown to decrease sleep latency and improve declarative memory.
  - Hoedlmoser K; Pecherstorfer T; Gruber G; Anderer P; Doppelmayr M; Klimesch W; Schabus M. Instrumental conditioning of human sensorimotor rhythm (12-15 Hz) and its impact on sleep as well as declarative learning. *SLEEP* 2008;31(10):1401-1408
Progressive Muscle Relaxation

- Progressive muscle relaxation is a procedure involving tensing and relaxing a series of muscles.
  - *Insomnia. Etiology, Evaluation, & Treatment*. 2006 AASM

- Involves working your way through the body, tensing a particular muscle group, followed by relaxation of that muscle group. The relaxation of particular parts of the body, progresses through the other muscles sequentially. Hence the term progressive relaxation.

- Each muscle group has less then a minute of tensing, little bit longer of relaxing, and entire process may take approximately 15-20 minutes.

- May be problematic with groups that have chronic pain.

- This is a structured form of relaxation, so it has been assumed to be one that is good for people who tend to be structured.
  - Lichstein. *Behavioral Sleep Medicine Series: Relaxation Approaches to Insomnia Webinar*. 2009 AASM.
Passive Relaxation

- Passive relaxation is similar to the progressive relaxation, however it is done without the tensing.
- More favorable to someone who has chronic pain.
- Beginning with a particular body part one would focus on comfortable sensations, soothing sensations.
- Each body part is relaxed for approximately less then a minute, and also does progressively involve other body parts through the body.
- It has been implied that this can even be used on focal areas of discomfort or pain, and if that is one of the causes of the insomnia this may be a favorable solution.

Lichstein. Behavioral Sleep Medicine Series: Relaxation Approaches to Insomnia Webinar. 2009 AASM.
Paradoxical Intent

- Paradoxical intent is a behavioral approach to insomnia.
- Attempting to force oneself to sleep can lead to Psychophysiological Insomnia.
- With paradoxical intent, instead one remains passively awake without any effort to fall asleep.
- It is partially designed to reduce the anxiety of not being able to sleep.
- Commonly one is gradually relieved as they learn to accept quiet wakefulness as an acceptable alternative.
- Allows one’s natural sleep drive to build until the individual is ready for sleep.
Cognitive Therapy

- Cognitive therapy for insomnia aims to change the negative thoughts about sleep into or positive ones.
- Such negative thoughts are commonly associated with heightened levels of anxiety.
- The basic elements of cognitive therapy include shifting the patient away from attributions that are inconsistent with good sleep.
- Also there is an attempt to control attributing too much to the consequences of a bad night.
Mindfulness

- Paying attention to something, in a particular way, on purpose, in the present moment, non-judgmentally.
  - Kabat-Zinn, 2003

- Theory: With 60,000 thoughts a day (and the emotions they evoke) whirling through the mind, it is easy to understand how the mind can get cluttered, overwhelmed, and unfocused. A calm, clear mind can be easily overwhelmed by the constant flow of thoughts, feelings, and sensations.
  - Burdick, 2013
Meditation, Mindfulness, and EBM

- Mindfulness promotes better health, in part, by improving sleep quality, which can be disrupted by stress, anxiety, and difficulty turning off the mind.
  - Winbush Kreitzer, 2007
- Formal meditation practices (body scan, yoga, sitting meditation) at home during an 8-week intervention led to increased mindfulness, which decreased psychological distress and increased psychological well-being.
  - Carmody & Baer, 2008
- Meditation practice is associated with lower levels of psychological distress, including less anxiety, depression, anger, and worry.
  - Baer, 2003; Brown, Ryan, & Creswell, 2007; Greeson & Brantley, in press; Grossman et al., 2004
- 8 weeks of mindfulness meditation training significantly reduced ruminative thinking.
  - Ramel et al., 2004
Hypnosis

- Hypnosis is a state of inner absorption, concentration and focused attention.
- The American Society of Clinical Hypnosis is the largest U.S. organization for health and mental health care professionals using clinical hypnosis. Founded by Milton H. Erickson, MD in 1957, ASCH promotes greater acceptance of hypnosis as a clinical tool with broad applications.
  - American Society of Clinical Hypnosis
Myths About Hypnosis

- People often fear that being hypnotized will make them lose control, surrender their will, and result in their being dominated, but a hypnotic state is not the same thing as gullibility or weakness.
- Another myth about hypnosis is that people lose consciousness and have amnesia.
- In hypnosis, the patient is not under the control of the hypnotist. Hypnosis is not something imposed on people, but something they do for themselves.
  - American Society of Clinical Hypnosis
Hypnosis and Sleep

- Hypnotic suggestions to specifically increase the amount and duration of slow wave sleep (SWS). Hypnotic suggestions might be a successful tool with a lower risk of adverse side effects than pharmacological treatments to extend SWS also in clinical and elderly populations.

- Use of hypnosis appears to facilitate efficient therapy for insomnia in school-age children.
Behavioral Treatment Issues

- Adherence
- Attrition
- Adverse effects
- Acceptability
- Availability
- Cost

*For relaxation – inconsistent practice. The time spent practicing relaxation tends to diminish with time.*

Behavioral Treatment Issues

- You cannot hurry or force relaxation. It may be suggested or influenced, however attempts to force relaxation not only may be ineffective but it may also provoke agitation.
- Practice of relaxation skills is important, at least twice daily.
  - Lichestein. Behavioral Sleep Medicine Series: Relaxation Approaches to Insomnia Webinar. 2009 AASM.
Summary

- Stress and anxiety lead to cortisol stress response, further leading to sympathetic hyperarousal.
- Insomnia leads to further hyperarousal.
- AASM Practice Parameters indicate that behavioral sleep medicine is effective for insomnia.
- AASM further indicates that when meds are used they should be done in setting of behavioral therapies.
- Relaxation Training is an Evidence Based Medicine approach.
- There are many forms of Relaxation Training, and it can be individualized for patient and clinician alike.
Thank You!

- Contact: www.ParadiseSleep.com

*Encourage others to encourage others!*
—Jose Colon, M.D., MPH